Claims

1. Method for electrical discharge machining of a workpiece with a tool electrode, comprising the steps of:

applying an erosion pulse on the tool electrode,

acquiring a voltage (U_e) applied on the tool electrode during the duration of erosion phase;

detecting an asymptotic behavior of the acquired voltage (U_e) or a value derived therefrom; and

interrupting the erosion pulse after the asymptotic behavior has been detected.

2. The method of claim 1, wherein the value derived from the asymptotic behavior is selected from the group consisting of discharge power and the ratio of acquired voltage to simultaneously flowing current.

3. The method of claim 1, comprising controlling a discharge current (I_e), which upon discharge flows to the tool electrode at least during a fraction of the duration of the erosion pulse, to maintain a constant value of the discharge current, and detecting the asymptotic behavior as the instant at which the derivative in time of the detected voltage (U_e) falls below a given threshold (reference) value.

4. The method of claim 3, comprising detecting the beginning of a discharge and, after interrupting the erosion pulse, introducing an interpulse period with a first duration (t_0), which depends on a second duration (t_e) defined as the time between the beginning of the discharge and the detection of the asymptotic behavior of the previous erosion pulse.

5. The method of claim 4, wherein the first duration (t_0) is proportional to the second duration (t_e).

6. The method of claim 4, wherein the first duration (t_0) further depends on an ignition delay time (t_i), which is defined as time between the application of the erosion pulse and the beginning of the discharge.

7. The method according to claim 6, comprising assigning the first duration (t_0) a minimum value should the ignition delay time (t_i) fall below a threshold value.

8. The method of claim 4, comprising controlling the discharge current (I_e), which upon discharge flows to the tool electrode during the duration of the erosion pulse, and increasing the discharge current to a given current value, during a third duration, which starts after the asymptotic behavior is detected and ends when the erosion pulse is interrupted.

9. The method of claim 1, comprising controlling the discharge current (I_e), which upon discharge flows to the tool electrode during the duration of the erosion pulse, by means of respective upper and lower enveloping curves, so that the discharge current ascends and descends between said enveloping curves, and interrupting the erosion pulse at a moment at which the current value of the discharge current (I_e) is at a maximum.

10. The method of claim 4, comprising setting further erosion parameters, depending on the second duration (t_e), which is defined as the time between the beginning of the discharge and the detection of the asymptotic behavior at the previous erosion pulse.

11. Apparatus for electrical discharge machining of a workpiece with an electrical discharge generator to produce erosion pulses to be applied on a tool electrode, wherein during the erosion pulse applied on the tool electrode the apparatus acquires the voltage (U_e) applied on the tool electrode, said apparatus comprising a device connected to the electrical discharge generator adapted to cause the electrical discharge generator to interrupt an erosion pulse, after detecting an asymptotic behavior of the acquired voltage (U_e) or of a value derived from it.

12. The apparatus of claim 11, wherein the value derived from the asymptotic behavior is selected from the group consisting of discharge power and the ratio of acquired voltage to simultaneously flowing current.

13. The apparatus of claim 11, wherein the electrical discharge generator, after an interrupted erosion pulse, detects the beginning of a discharge and introduces an interpulse period with a first duration (t_0), which depends on a second duration (t_i), defined as the time between the beginning of the discharge and the detection of the asymptotic behavior at the previous erosion pulse.

14. The apparatus of claim 13, wherein the electrical discharge generator controls the discharge current (I_e), which at discharge flows to the tool electrode during the duration of an erosion pulse, in such way that it increases the discharge current to a given value during a third duration, which starts after

detection of the asymptotic behavior and ends with the interruption of the erosion pulse.

15. The apparatus of claim 11, wherein the electrical discharge generator controls the discharge current (I_e), which upon a discharge flows to the tool electrode during the duration of an erosion pulse, with respective upper and lower enveloping curves, so that the discharge current (I_e) ascends and descends between said enveloping curves and interrupts the erosion pulse at a time when the value of the discharge current (I_e) is highest.